IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

ACTIVE WIRELESS TECHNOLOGIES LLC,	§	Case No.
	§	
	§	**JURY TRIAL DEMANDED**
Plaintiff,	§	
	§	
v.	§	
	§	
VERIZON COMMUNICATIONS, INC. and CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS	§	
	§	
	§	
Defendants.	§	

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Active Wireless Technologies LLC ("AWT" or "Plaintiff") files this original Complaint against Defendants Verizon Communications, Inc. and Cellco Partnership d/b/a Verizon Wireless (collectively, "Verizon" or "Defendants"), for patent infringement under 35 U.S.C. § 271 and alleges as follows:

THE PARTIES

1. AWT is a limited liability company, organized and existing under the laws of the State of Texas, with its principal place of business located at 104 East Houston Street, Suite 140, Marshall, Texas 75670.

2. Defendant Verizon Communications, Inc. is a Delaware corporation with a principal place of business at 1095 Avenue of the Americas, New York, NY 10036. Verizon Communications, Inc. can be served at its registered agent for service: The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801. Upon information and belief, Verizon Communications, Inc. does business in Texas, directly or through

intermediaries, and offers its products and/or services, including those accused herein of infringement, to customers and potential customers located in Texas, including in the judicial Eastern District of Texas.

3. Defendant Cellco Partnership d/b/a Verizon Wireless is a general partnership organized and existing under the laws of the State of Delaware, with a principal place of business at 1 Verizon Way, Basking Ridge, NJ 07920. Verizon Wireless can be served at its registered agent for service: The Corporation Trust Company at Corporation Trust Center 1209 Orange Street, Wilmington, DE. Upon information and belief, Verizon USA, Inc. does business in Texas, directly or through intermediaries, and offers its products and/or services, including those accused herein of infringement, to customers and potential customers located in Texas, including in the judicial Eastern District of Texas.

JURISDICTION

4. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 1, *et seq*. This Court has jurisdiction over this action pursuant to 28 U.S.C. §§ 1331, 1332, 1338, and 1367.

5. This Court has personal jurisdiction over Verizon in this action because Verizon has committed acts within the Eastern District of Texas giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Verizon would not offend traditional notions of fair play and substantial justice. Verizon conducts business and has committed acts of patent infringement and/or has induced acts of patent infringement by others in this Judicial District and/or has contributed to patent infringement by others in this Judicial District, the State of Texas, and elsewhere in the United States by, among other things, offering to sell and selling products and/or services that infringe the Patents-in-Suit.

6. Venue is proper in this Judicial District pursuant to 28 U.S.C. §§ 1391 and 1400(b). Verizon is registered to do business in Texas and, upon information and belief, Verizon has transacted business in the Eastern District of Texas and has committed acts of direct and indirect infringement in the Eastern District of Texas. Verizon has regular and established places of business in this Judicial District, including at least 1111 E Grand Avenue, Marshall, TX 75670; 500 East Loop 281, Longview, TX 75605; 2400 South Jefferson Avenue, Mount Pleasant, TX 75455; 1006 East End Boulevard North, Suite A, Marshall, Texas 75670; 741 North Central Expressway, Plano, Texas 75075; 2330 Preston Road, Suite 500, Frisco, Texas 75034; 3220 East Hebron Parkway, Suite 114, Carrollton, Texas 75010; 5020 State Highway 121, The Colony, Texas 75056; and 204 Central Expressway South, Suite 40, Allen, Texas 75013; 1271 West Exchange Pkwy, Allen, TX, 75013; 190 East Stacy Road, Allen, TX, 75002; 8049 Preston Road, Frisco, TX, 75034; 2035 North Central Expressway, Suite 620, McKinney, TX 75070; 3610 West University Drive, McKinney, TX, 75071; 1016 West SW Loop 323, Tyler, Texas 75701; 8988 South Broadway Avenue, Suite 110, Tyler, TX 75703; 6874 South Broadway Avenue, Tyler, TX 75703; 2818 West University Drive, Denton, TX 76201; 1805 South Loop 288, Denton, TX 76205; 3113 North US Highway 75, Sherman, TX 75090; 380 Shannon Road East, Sulphur Springs, Texas 75482; and 218 East FM 544, Murphy, TX, 75094.

7. Verizon operates and sells access to a mobile network that provides telecommunication, Internet service, and other services to customers via cellular base stations located in this District and throughout the United States, in infringement of the asserted patents. Verizon's network coverage extends to cities in this District, including within the Marshall division, according to Verizon's website.

8. In other recent actions, Verizon has either sought out, admitted, or not contested that this federal judicial district is a proper venue for patent infringement actions against it. *See, e.g.*, Agreed Joint Motion to Transfer Severed Action to the Eastern District of Texas, *Dali Wireless, Inc. v. Cellco Partnership d/b/a Verizon Wireless*, Case No. 6:22-cv-00104-ADA (W.D. Texas); *General Access Solutions, Ltd. v. Cellco Partnership d/b/a Verizon Wireless et al.*, Case No. 2:22-cv-00394 (E.D. Tex.); *Howlink Global LLC v. Verizon Communications Inc. et al.*, Case No. 2-22-cv-00042 (E.D. Tex.); *Finesse Wireless LLC v. Cellco Partnership d/b/a Verizon Wireless*, Case No. 2-21-cv-00317 (E.D. Tex.); Verizon's Answer and Counterclaims (Dkt. No. 20), *Cobblestone Wireless, LLC v. T-Mobile USA, Inc., T-Mobile US Inc.*, Case No. 2:22-cv-00477-JRG-RSP (Lead Case), *Cobblestone Wireless, LLC v. Cellco Partnership d/b/a Verizon Wireless*, Case No. 2:22- cv-00478-JRG-RSP (Member Case).

PATENTS-IN-SUIT

9. On January 7, 2020, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,531,443 (the "'443 Patent") entitled "Physical Uplink Control Channel (PUCCH) Format Adaptation for 5th Generation (5G) New Radio (NR)." A true and correct copy of the '443 Patent is attached as Exhibit 1.

10. On May 25, 2021, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 11,019,557 (the "'557 Patent") entitled "Apparatus and Method for Acquisition of Periodically Broadcasted System Information in Wireless Communication." A true and correct copy of the '557 Patent is attached as Exhibit 2.

11. On September 22, 2020, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,785,764 (the "'764 Patent") entitled "Information Change

Transmission Method and Device for Single-Cell Multicast Service." A true and correct copy of the '764 Patent is attached as Exhibit 3.

12. On March 24, 2020, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,601,566 (the "'566 Patent") entitled "Multiple Slot Long Physical Uplink Control Channel (PUCCH) Design for 5th Generation (5G) New Radio (NR)." A true and correct copy of the '566 Patent is attached as Exhibit 4.

13. AWT is the sole and exclusive owner of all right, title, and interest in the '443 Patent, the '557 Patent, the '764 Patent, and the '566 Patent (collectively, the "Patents-in-Suit") and holds the exclusive right to take all actions necessary to enforce its rights to the Patents-in-Suit, including the filing of this patent infringement lawsuit. AWT also has the right to recover all damages for past, present, and future infringement of the Patents-in-Suit.

THE INFRINGING INSTRUMENTALITIES

14. Verizon operates cellular wireless networks employing several wireless communication technologies including, but not limited to, 5G and NB-IoT technologies. Verizon also sells and offers for sale a variety of devices that make use of these same wireless communication technologies.

15. For its wireless communication technologies, Verizon generally advertises its plans to enter the market and deploy related cellular wireless networks, and associated equipment and services. For example, in May of 2019, Verizon "launch[ed] its Narrowband IoT Network nationwide." *See, e.g.*, Exhibit 5, available at https://www.verizon.com/about/news/verizon-extends-iot-leadership.

16. Similarly, in October 2018, Verizon announced that "Verizon turns on world's first 5G network" and that a "Houston resident is first 5G customer on the globe." *See, e.g.*, Exhibit 6,

available at https://www.verizon.com/about/news/verizon-turns-worlds-first-5g-network. This announcement followed an early announcement by Verizon that "5G is here" and that "the world's first commercial 5G service, Verizon 5G Home, launches on Oct. 1." *See, e.g.*, Exhibit 7, https://www.verizon.com/about/news/5g-here.

17. Upon information and belief, Verizon owns, leases, maintains, and/or operates cellular base stations in this District that provide at least NB-IoT and 5G data services to Verizon customers in this District, including numerous cell tower locations in Tyler, Texas; Longview, Texas; and Marshall, Texas. Verizon offers at least NB-IoT and 5G data coverage to customers in this District and within the Marshall division. According to its website, Verizon also offers and provides at least NB-IoT and 5G services and equipment to customers in this District.

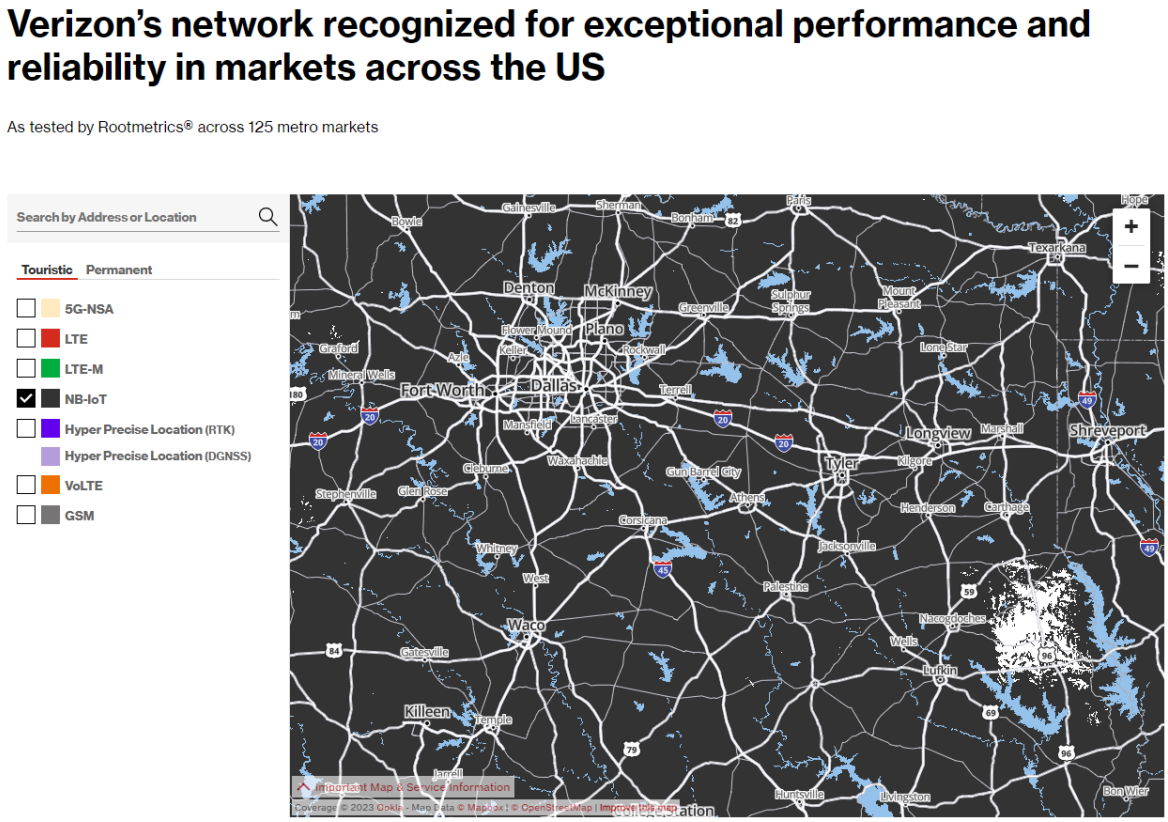


Exhibit 8, available at https://thingspace.verizon.com/documentation/get-started/global-coverage-map.html

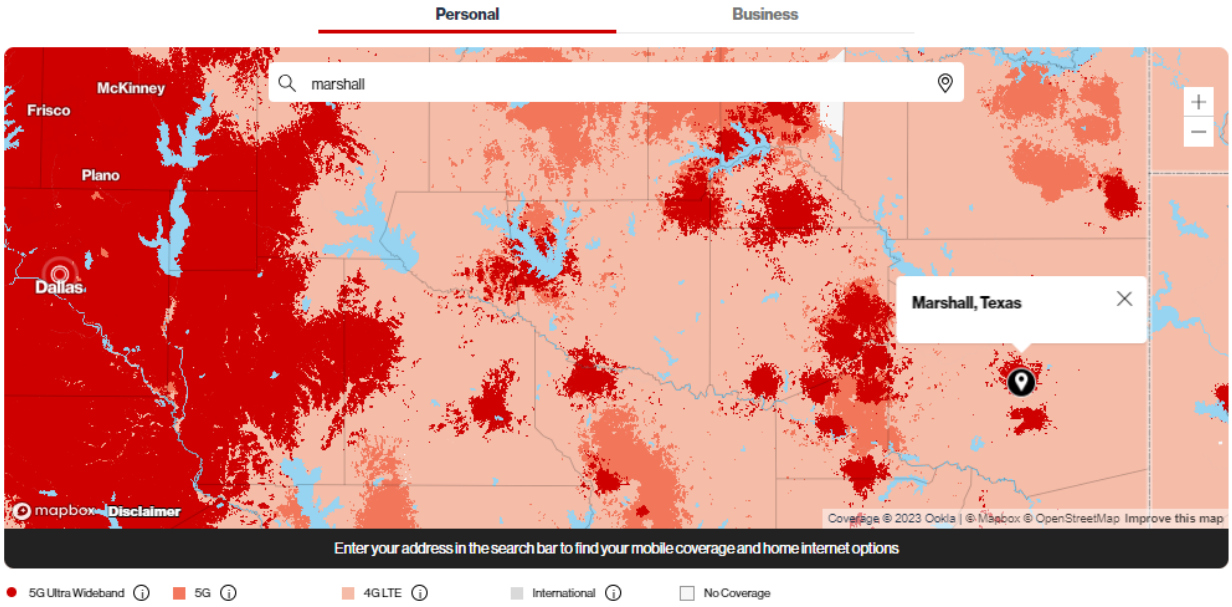


Exhibit 9, available at https://www.verizon.com/coverage-map/

18. The products accused of infringing the Patents-in-Suit include, but are not limited to, at least Defendants' NB-IoT cellular stations, 5G cellular base stations (including 5G and 5G Ultra Wideband base stations), 5G hardware, software, radio units, and baseband units, and associated equipment, services, and platforms (*e.g.*, Verizon Connect, ThingSpace) (collectively, the "Accused Products").

19. Upon information and belief, each of these Accused Products is 3GPP-compliant.

COUNT I
(Infringement of the '443 Patent)

20. Paragraphs 1 through 19 are incorporated by reference as if fully set forth herein.

21. AWT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '443 Patent.

22. Defendants have and continue to directly infringe the '443 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '443 Patent. Such products include at least the Accused Products.

23. For example, upon information and belief, Defendants have and continue to directly infringe at least claim 3 of the '443 Patent by making, using, offering to sell, selling, and/or importing into the United States products and services that operate with at least phones, tablets, and hotspot devices that implement 3GPP standards (*e.g.*, 3GPP TS 38.213 V15.14.0), such as the Accused Products which include a base station (gNB), comprising: sending circuitry configured to send a physical downlink shared channel (PDSCH) that includes code block groups (CBGs) of a transport block; and receiving circuitry configured to receive CBG-based HARQ-ACK, wherein for the CBG-based HARQ-ACK corresponding to the PDSCH which is scheduled in a common search space (CSS), the receiving circuitry is configured to receive one HARQ-ACK bit for the transport block, for the CBG-based HARQ-ACK corresponding to the PDSCH which is scheduled in a UE-specific search space (USS), the receiving circuitry is configured to receive HARQ-ACK bits of all CBGs.

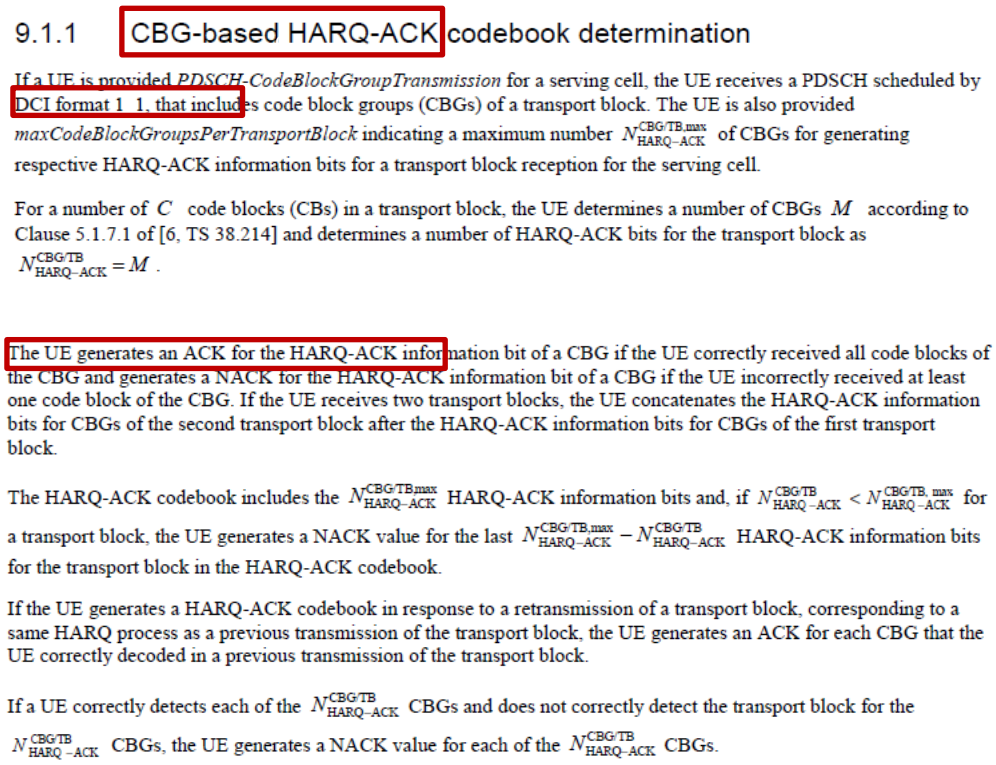
24. For example, upon information and belief, each Accused Product comprises a base station compliant with the 3GPP TS 38.213 V15.14.0 standard.

Verizon

"Verizon is delighted that the 3GPP is moving quickly to release a global standard for mobile 5G," said Ed Chan, Chief Technology Architect and Network Planning."With this important 3GPP milestone, Verizon is once again well positioned to deliver next-generation technology to customers just as we did with 4G LTE."

Exhibit 13, available at https://www.3gpp.org/news-events/3gpp-news/industry-pr-5g

25. By way of example, each Accused Product comprises sending circuitry configured to send a physical downlink shared channel (PDSCH) that includes code block groups (CBGs) of a transport block and receiving circuitry configured to receive CBG-based HARQ-ACK.



9.1.1 CBG-based HARQ-ACK codebook determination

If a UE is provided *PDSCH-CodeBlockGroupTransmission* for a serving cell, the UE receives a PDSCH scheduled by DCI format 1_1, that includes code block groups (CBGs) of a transport block. The UE is also provided *maxCodeBlockGroupsPerTransportBlock* indicating a maximum number $N_{HARQ-ACK}^{CBG/TB,max}$ of CBGs for generating respective HARQ-ACK information bits for a transport block reception for the serving cell.

For a number of C code blocks (CBs) in a transport block, the UE determines a number of CBGs M according to Clause 5.1.7.1 of [6, TS 38.214] and determines a number of HARQ-ACK bits for the transport block as $N_{HARQ-ACK}^{CBG/TB} = M$.

The UE generates an ACK for the HARQ-ACK information bit of a CBG if the UE correctly received all code blocks of the CBG and generates a NACK for the HARQ-ACK information bit of a CBG if the UE incorrectly received at least one code block of the CBG. If the UE receives two transport blocks, the UE concatenates the HARQ-ACK information bits for CBGs of the second transport block after the HARQ-ACK information bits for CBGs of the first transport block.

The HARQ-ACK codebook includes the $N_{HARQ-ACK}^{CBG/TB,max}$ HARQ-ACK information bits and, if $N_{HARQ-ACK}^{CBG/TB} < N_{HARQ-ACK}^{CBG/TB,max}$ for a transport block, the UE generates a NACK value for the last $N_{HARQ-ACK}^{CBG/TB,max} - N_{HARQ-ACK}^{CBG/TB}$ HARQ-ACK information bits for the transport block in the HARQ-ACK codebook.

If the UE generates a HARQ-ACK codebook in response to a retransmission of a transport block, corresponding to a same HARQ process as a previous transmission of the transport block, the UE generates an ACK for each CBG that the UE correctly decoded in a previous transmission of the transport block.

If a UE correctly detects each of the $N_{HARQ-ACK}^{CBG/TB}$ CBGs and does not correctly detect the transport block for the $N_{HARQ-ACK}^{CBG/TB}$ CBGs, the UE generates a NACK value for each of the $N_{HARQ-ACK}^{CBG/TB}$ CBGs.

Exhibit 14 ("3GPP TS 38.213 version 15.14.0 Release 15"), at 40-41, available at https://www.etsi.org/deliver/etsi_ts/138200_138299/138213/15.14.00_60/ts_138213v151400p.pdf

26. By further way of example, each Accused Product comprises receiving circuitry configured to receive one HARQ-ACK bit for the transport block for the CBG-based HARQ-ACK corresponding to the PDSCH which is scheduled in a common search space (CSS).

9.1 HARQ-ACK codebook determination

If a UE receives a PDSCH without receiving a corresponding PDCCH, or if the UE receives a PDCCH indicating a SPS PDSCH release, the UE generates one corresponding HARQ-ACK information bit.

If a UE is not provided *PDSCH-CodeBlockGroupTransmission*, the UE generates one HARQ-ACK information bit per transport block.

For a HARQ-ACK information bit, a UE generates an ACK if the UE detects a DCI format 1_0 that provides a SPS PDSCH release or correctly decodes a transport block, and generates a NACK if the UE does not correctly decode the transport block.

A UE does not expect to be indicated to transmit HARQ-ACK information for more than one SPS PDSCH receptions in a same PUCCH.

In the following, the CRC for DCI format 1_0 or DCI format 1_1 is scrambled with a C-RNTI, an MCS-C-RNTI, or a CS-RNTI.

Id. at 40.

The UE generates an ACK for the HARQ-ACK information bit of a CBG if the UE correctly received all code blocks of the CBG and generates a NACK for the HARQ-ACK information bit of a CBG if the UE incorrectly received at least one code block of the CBG. If the UE receives two transport blocks, the UE concatenates the HARQ-ACK information bits for CBGs of the second transport block after the HARQ-ACK information bits for CBGs of the first transport block.

The HARQ-ACK codebook includes the $N_{\text{HARQ-ACK}}^{\text{CBG/TB,max}}$ HARQ-ACK information bits and, if $N_{\text{HARQ-ACK}}^{\text{CBG/TB}} < N_{\text{HARQ-ACK}}^{\text{CBG/TB, max}}$ for a transport block, the UE generates a NACK value for the last $N_{\text{HARQ-ACK}}^{\text{CBG/TB,max}} - N_{\text{HARQ-ACK}}^{\text{CBG/TB}}$ HARQ-ACK information bits for the transport block in the HARQ-ACK codebook.

If the UE generates a HARQ-ACK codebook in response to a retransmission of a transport block, corresponding to a same HARQ process as a previous transmission of the transport block, the UE generates an ACK for each CBG that the UE correctly decoded in a previous transmission of the transport block.

If a UE correctly detects each of the $N_{\text{HARQ-ACK}}^{\text{CBG/TB}}$ CBGs and does not correctly detect the transport block for the $N_{\text{HARQ-ACK}}^{\text{CBG/TB}}$ CBGs, the UE generates a NACK value for each of the $N_{\text{HARQ-ACK}}^{\text{CBG/TB}}$ CBGs.

Id. at 41.

If a UE receives a SPS PDSCH, or a SPS PDSCH release, or a PDSCH that is scheduled by a DCI format 1_0 and if

- the UE is configured with one serving cell, and
- $\mathcal{C}(M_{A,c})=1$, and
- *PDSCH-CodeBlockGroupTransmission* is provided to the UE

the UE generates HARQ-ACK information only for the transport block in the PDSCH or only for the SPS PDSCH release.

Id. at 44.

For each DL BWP configured to a UE in a serving cell, the UE is provided by higher layers with $S \leq 10$ search space sets where, for each search space set from the S search space sets, the UE is provided the following by *SearchSpace*:

- a search space set index s, $0 < s < 40$, by *searchSpaceId*
- an association between the search space set s and a CORESET p by *controlResourceSetId*
- a PDCCH monitoring periodicity of k_s slots and a PDCCH monitoring offset of o_s slots, by *monitoringSlotPeriodicityAndOffset*
- a PDCCH monitoring pattern within a slot, indicating first symbol(s) of the CORESET within a slot for PDCCH monitoring, by *monitoringSymbolsWithinSlot*
- a duration of $T_s < k_s$ slots indicating a number of slots that the search space set s exists by *duration*
- a number of PDCCH candidates $M_s^{(L)}$ per CCE aggregation level L by *aggregationLevel1*, *aggregationLevel2*, *aggregationLevel4*, *aggregationLevel8*, and *aggregationLevel16*, for CCE aggregation level 1, CCE aggregation level 2, CCE aggregation level 4, CCE aggregation level 8, and CCE aggregation level 16, respectively
- an indication that search space set s is either a CSS set or a USS set by *searchSpaceType*
- if search space set s is a CSS set
  - an indication by *dci-Format0-0-AndFormat1-0* to monitor PDCCH candidates for DCI format 0_0 and DCI format 1_0
  - an indication by *dci-Format2-0* to monitor one or two PDCCH candidates for DCI format 2_0 and a corresponding CCE aggregation level
  - an indication by *dci-Format2-1* to monitor PDCCH candidates for DCI format 2_1
  - an indication by *dci-Format2-2* to monitor PDCCH candidates for DCI format 2_2
  - an indication by *dci-Format2-3* to monitor PDCCH candidates for DCI format 2_3
- if search space set s is a USS set, an indication by *dci-Formats* to monitor PDCCH candidates either for DCI format 0_0 and DCI format 1_0, or for DCI format 0_1 and DCI format 1_1

Id. at 78-79.

27. By further way of example, each Accused Product comprises receiving circuitry configured to receive HARQ-ACK bits of all CBG for the CBG-based HARQ-ACK corresponding to the PDSCH which is scheduled in a UE-specific search space (USS).

9.1.1 CBG-based HARQ-ACK codebook determination

If a UE is provided *PDSCH-CodeBlockGroupTransmission* for a serving cell, the UE receives a PDSCH scheduled by DCI format 1_1, that includes code block groups (CBGs) of a transport block. The UE is also provided *maxCodeBlockGroupsPerTransportBlock* indicating a maximum number $N_{HARQ-ACK}^{CBG/TB,max}$ of CBGs for generating respective HARQ-ACK information bits for a transport block reception for the serving cell.

For a number of C code blocks (CBs) in a transport block, the UE determines a number of CBGs M according to Clause 5.1.7.1 of [6, TS 38.214] and determines a number of HARQ-ACK bits for the transport block as $N_{HARQ-ACK}^{CBG/TB} = M$.

Id. at 40.

If $O_{ACK} + O_{SR} + O_{CSI} \leq 11$, the UE determines a number of HARQ-ACK information bits $n_{HARQ-ACK}$ for obtaining a transmission power for a PUCCH, as described in Clause 7.2.1, as $n_{HARQ-ACK} = \sum_{c=0}^{N_{cells}^{DL}-1} \sum_{m=0}^{M_c-1} N_{m,c}^{received} + \sum_{c=0}^{N_{cells}^{DL}-1} \sum_{m=0}^{M_c-1} N_{m,c}^{received,CBG}$

where

- $N_{m,c}^{received}$ is the number of transport blocks the UE receives in PDSCH reception occasion m for serving cell c if *harq-ACK-SpatialBundlingPUCCH* and *PDSCH-CodeBlockGroupTransmission* are not provided, or the number of transport blocks the UE receives in PDSCH reception occasion m for serving cell c if *PDSCH-CodeBlockGroupTransmission* is provided and the PDSCH reception is scheduled by a DCI format 1_0, or the number of PDSCH receptions if *harq-ACK-SpatialBundlingPUCCH* is provided or SPS PDSCH release in PDSCH reception occasion m for serving cell c and the UE reports corresponding HARQ-ACK information in the PUCCH.

- $N_{m,c}^{received,CBG}$ is the number of CBGs the UE receives in a PDSCH reception occasion m for serving cell c if *PDSCH-CodeBlockGroupTransmission* is provided and the PDSCH reception is scheduled by a DCI format 1_1 and the UE reports corresponding HARQ-ACK information in the PUCCH.

Id. at 46.

For each DL BWP configured to a UE in a serving cell, the UE is provided by higher layers with $S \leq 10$ search space sets where, for each search space set from the S search space sets, the UE is provided the following by *SearchSpace*:

- a search space set index s, $0 < s < 40$, by *searchSpaceId*
- an association between the search space set s and a CORESET p by *controlResourceSetId*
- a PDCCH monitoring periodicity of k_s slots and a PDCCH monitoring offset of o_s slots, by *monitoringSlotPeriodicityAndOffset*
- a PDCCH monitoring pattern within a slot, indicating first symbol(s) of the CORESET within a slot for PDCCH monitoring, by *monitoringSymbolsWithinSlot*
- a duration of $T_s < k_s$ slots indicating a number of slots that the search space set s exists by *duration*
- a number of PDCCH candidates $M_s^{(L)}$ per CCE aggregation level L by *aggregationLevel1*, *aggregationLevel2*, *aggregationLevel4*, *aggregationLevel8*, and *aggregationLevel16*, for CCE aggregation level 1, CCE aggregation level 2, CCE aggregation level 4, CCE aggregation level 8, and CCE aggregation level 16, respectively
- an indication that search space set s is either a CSS set or a USS set by *searchSpaceType*
- if search space set s is a CSS set
  - an indication by *dci-Format0-0-AndFormat1-0* to monitor PDCCH candidates for DCI format 0_0 and DCI format 1_0
  - an indication by *dci-Format2-0* to monitor one or two PDCCH candidates for DCI format 2_0 and a corresponding CCE aggregation level
  - an indication by *dci-Format2-1* to monitor PDCCH candidates for DCI format 2_1
  - an indication by *dci-Format2-2* to monitor PDCCH candidates for DCI format 2_2
  - an indication by *dci-Format2-3* to monitor PDCCH candidates for DCI format 2_3
- if search space set s is a USS set, an indication by *dci-Formats* to monitor PDCCH candidates either for DCI format 0_0 and DCI format 1_0, or for DCI format 0_1 and DCI format 1_1

Id. at 78-79.

28. Verizon has indirectly infringed and continues to indirectly infringe one or more claims of the '443 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Verizon's partners, customers, clients, and end-users, in this District and elsewhere in the United States. For example, Verizon's partners, customers, clients, and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '443 Patent. Verizon induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and

providing instructions, documentation, and other information to partners, customers, clients, and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation related to the Accused Products. Because of Verizon's inducement, Verizon's partners, customers, clients, and end-users use the Accused Products in a way Verizon intends and they directly infringe the '443 Patent. Verizon performs these affirmative acts with knowledge of the '443 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '443 Patent.

29. Verizon has indirectly infringed and continues to indirectly infringe one or more claims of the '443 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as partners, customers, clients, and end-users, in this District and elsewhere in the United States. Verizon's affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold, and offered for sale contribute to others' use and manufacture of the Accused Products such that the '443 Patent is directly infringed by others. The accused components within the Accused Products are material to the invention of the '443 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Verizon to be especially made or adapted for use in the infringement of the '443 Patent. Verizon performs these affirmative acts with knowledge of the '443 Patent and with intent, or willful blindness, that they cause the direct infringement of the '443 Patent.

30. AWT has suffered damages as a result of Defendants' direct and indirect infringement of the '443 Patent in an amount to be proved at trial.

COUNT II
(Infringement of the '557 Patent)

31. Paragraphs 1 through 19 are incorporated by reference as if fully set forth herein.

32. AWT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '557 Patent.

33. Defendants have and continue to directly infringe the '557 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '557 Patent. Such products include at least the Accused Products.

34. For example, Defendants have and continue to directly infringe at least claim 9 of the '557 Patent by making, using, offering to sell, selling, and/or importing into the United States products and services that operate with at least phones, tablets, and hotspot devices that implement 3GPP standards (*e.g.*, 3GPP TS 38.331 version 15.13.0 Release 15), such as the Accused Products, which include a base station apparatus of a radio access network (RAN) that communicates over a radio interface with a user equipment, the base station apparatus comprising: transmitting circuitry configured to transmit a first type system information block (SIB), the first type SIB comprising: scheduling information of a system information (SI) message, the SI message comprising at least one second type SIB, the scheduling information configuring SI windows, the SI windows comprising periodically occurring time windows in which the SI message is transmitted; a parameter associated with a condition for determination of a failure of an SI message acquisition process; and an indication of broadcast status for the SI message, the indication indicating broadcasting; and processor circuitry configured to cause the transmitting circuitry to broadcast the SI message; wherein: the first type SIB is re-acquired by the user equipment upon the user equipment failing on the SI message acquisition process in at least one of the SI windows

to receive the SI message, the base station apparatus is a current serving access node of the user equipment.

35. For example, upon information and belief, each Accused Product comprises a base station apparatus of a radio access network (RAN) that communicates over a radio interface with a user equipment and is a current serving access node of the user equipment, which is compliant with the 3GPP TS 38.331 V15.13.0 standard.

Verizon

"Verizon is delighted that the 3GPP is moving quickly to release a global standard for mobile 5G," said Ed Chan, Chief Technology Architect and Network Planning."With this important 3GPP milestone, Verizon is once again well positioned to deliver next-generation technology to customers just as we did with 4G LTE."

Exhibit 13, available at https://www.3gpp.org/news-events/3gpp-news/industry-pr-5g

36. By way of example, each Accused Product comprises transmitting circuitry configured to transmit a first type system information block (SIB) comprising scheduling information of a system information (SI) message, the SI message comprising at least one second type SIB, the scheduling information configuring SI windows, the SI windows comprising periodically occurring time windows in which the SI message is transmitted.

5.2 System information

5.2.1 Introduction

System Information (SI) is divided into the *MIB* and a number of SIBs where:

- the *SIB1* is transmitted on the DL-SCH with a periodicity of 160 ms and variable transmission repetition periodicity within 160 ms as specified in TS 38.213 [13], clause 13. The default transmission repetition periodicity of *SIB1* is 20 ms but the actual transmission repetition periodicity is up to network implementation. For SSB and CORESET multiplexing pattern 1, *SIB1* repetition transmission period is 20 ms. For SSB and CORESET multiplexing pattern 2/3, *SIB1* transmission repetition period is the same as the SSB period (TS 38.213 [13], clause 13). *SIB1* includes information regarding the availability and scheduling (e.g. mapping of SIBs to SI message, periodicity, SI-window size) of other SIBs with an indication whether one or more SIBs are only provided on-demand and, in that case, the configuration needed by the UE to perform the SI request. *SIB1* is cell-specific SIB;

- SIBs other than *SIB1* are carried in *SystemInformation* (SI) messages, which are transmitted on the DL-SCH. Only SIBs having the same periodicity can be mapped to the same SI message. Each SI message is transmitted within periodically occurring time domain windows (referred to as SI-windows with same length for all SI messages). Each SI message is associated with an SI-window and the SI-windows of different SI messages do not overlap. That is, within one SI-window only the corresponding SI message is transmitted. An SI message may be transmitted a number of times within the SI-window. Any SIB except *SIB1* can be configured to be cell specific or area specific, using an indication in *SIB1*. The cell specific SIB is applicable only within a cell that provides the SIB while the area specific SIB is applicable within an area referred to as SI area, which consists of one or several cells and is identified by *systemInformationAreaID*;

Exhibit 15 ("3GPP TS 38.331 version 15.13.0 Release 15"), at 25-26, available at https://www.etsi.org/deliver/etsi_ts/138300_138399/138331/15.13.00_60/ts_138331v151300p.pdf

5.2.2.3 Acquisition of System Information

5.2.2.3.1 Acquisition of *MIB* and *SIB1*

The UE shall:

1> apply the specified BCCH configuration defined in 9.1.1.1;

1> if the UE is in RRC_IDLE or in RRC_INACTIVE; or

1> if the UE is in RRC_CONNECTED while T311 is running:

2> acquire the *MIB*, which is scheduled as specified in TS 38.213 [13];

2> if the UE is unable to acquire the *MIB*;

3> perform the actions as specified in clause 5.2.2.5;

2> else:

3> perform the actions specified in clause 5.2.2.4.1.

1> if the UE is in RRC_CONNECTED with an active BWP with common search space configured by *searchSpaceSIB1* and *pagingSearchSpace* and has received an indication about change of system information; or

1> if the UE is in RRC_IDLE or in RRC_INACTIVE; or

1> if the UE is in RRC_CONNECTED while T311 is running:

2> if *ssb-SubcarrierOffset* indicates *SIB1* is transmitted in the cell (TS 38.213 [13]) and if *SIB1* acquisition is required for the UE:

3> acquire the *SIB1*, which is scheduled as specified in TS 38.213 [13];

3> if the UE is unable to acquire the *SIB1*:

4> perform the actions as specified in clause 5.2.2.5;

Id. at 28.

5.2.2.4.2 Actions upon reception of the *SIB1*

Upon receiving the *SIB1* the UE shall:

4> if the UE has not stored a valid version of a SIB, in accordance with sub-clause 5.2.2.2.1, of one or several required SIB(s), in accordance with sub-clause 5.2.2.1:

5> for the SI message(s) that, according to the *si-SchedulingInfo*, contain at least one required SIB and for which *si-BroadcastStatus* is set to broadcasting:

6> acquire the SI message(s) as defined in sub-clause 5.2.2.3.2;

Id. at 31-32.

– *SIB1*

SIB1 contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information. It also contains radio resource configuration information that is common for all UEs and barring information applied to the unified access control.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: Network to UE

***SIB1* message**

```
-- ASN1START
-- TAG-SIB1-START

SIB1 ::=        SEQUENCE {
    cellSelectionInfo                   SEQUENCE {
        q-RxLevMin                          Q-RxLevMin,
        q-RxLevMinOffset                    INTEGER (1..8)                                  OPTIONAL,   -- Need S
        q-RxLevMinSUL                       Q-RxLevMin                                      OPTIONAL,   -- Need R
        q-QualMin                           Q-QualMin                                       OPTIONAL,   -- Need S


    q-QualMinOffset                     INTEGER (1..8)                                  OPTIONAL    -- Need S
  }                                                                                         OPTIONAL,   -- Cond Standalone
  cellAccessRelatedInfo             CellAccessRelatedInfo,
  connEstFailureControl             ConnEstFailureControl                               OPTIONAL,   -- Need R
  si-SchedulingInfo                 SI-SchedulingInfo                                   OPTIONAL,   -- Need R
  servingCellConfigCommon           ServingCellConfigCommonSIB                          OPTIONAL,   -- Need R
  ims-EmergencySupport              ENUMERATED {true}                                   OPTIONAL,   -- Need R
  eCallOverIMS-Support              ENUMERATED {true}                                   OPTIONAL,   -- Cond Absent
  ue-TimersAndConstants             UE-TimersAndConstants                               OPTIONAL,   -- Need R

  uac-BarringInfo                   SEQUENCE {
      uac-BarringForCommon              UAC-BarringPerCatList                           OPTIONAL,   -- Need S
      uac-BarringPerPLMN-List           UAC-BarringPerPLMN-List                         OPTIONAL,   -- Need S
      uac-BarringInfoSetList            UAC-BarringInfoSetList,
      uac-AccessCategory1-SelectionAssistanceInfo CHOICE {
          plmnCommon                        UAC-AccessCategory1-SelectionAssistanceInfo,
          individualPLMNList                SEQUENCE (SIZE (2..maxPLMN)) OF UAC-AccessCategory1-SelectionAssistanceInfo
      }                                                                                 OPTIONAL    -- Need S
  }                                                                                     OPTIONAL,   -- Need R
```

Id. at 167-169.

– *SI-SchedulingInfo*

The IE *SI-SchedulingInfo* contains information needed for acquisition of SI messages.

***SI-SchedulingInfo* information element**

```
-- ASN1START
-- TAG-SI-SCHEDULINGINFO-START

SI-SchedulingInfo ::=               SEQUENCE {
    schedulingInfoList                  SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo,
    si-WindowLength                     ENUMERATED {s5, s10, s20, s40, s80, s160, s320, s640, s1280},
    si-RequestConfig                    SI-RequestConfig                                        OPTIONAL,  -- Cond MSG-1
    si-RequestConfigSUL                 SI-RequestConfig                                        OPTIONAL,  -- Cond SUL-MSG-1
    systemInformationAreaID             BIT STRING (SIZE (24))                                  OPTIONAL,   -- Need R
    ...
}

SchedulingInfo ::=                  SEQUENCE {
    si-BroadcastStatus                  ENUMERATED {broadcasting, notBroadcasting},
    si-Periodicity                      ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},
    sib-MappingInfo                     SIB-Mapping


}

SIB-Mapping ::=                     SEQUENCE (SIZE (1..maxSIB)) OF SIB-TypeInfo

SIB-TypeInfo ::=                    SEQUENCE {
    type                                ENUMERATED {sibType2, sibType3, sibType4, sibType5, sibType6, sibType7, sibType8, sibType9,
                                                    spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1,... },
    valueTag                            INTEGER (0..31)                                         OPTIONAL, -- Cond SIB-TYPE
    areaScope                           ENUMERATED {true}                                       OPTIONAL -- Need S
}
```

Id. at 363-64.

37. By further way of example, in each of the Accused Products, a parameter associated with a condition for determination of a failure of an SI message acquisition process.

5.2.2.2 SIB validity and need to (re)-acquire SIB

5.2.2.2.1 SIB validity

The UE shall apply the SI acquisition procedure as defined in clause 5.2.2.3 upon cell selection (e.g. upon power on), cell-reselection, return from out of coverage, after reconfiguration with sync completion, after entering the network from another RAT, upon receiving an indication that the system information has changed, upon receiving a PWS notification; and whenever the UE does not have a valid version of a stored SIB.

When the UE acquires a *MIB* or a *SIB1* or an SI message in a serving cell as described in clause 5.2.2.3, and if the UE stores the acquired SIB, then the UE shall store the associated *areaScope*, if present, the first *PLMN-Identity* in the *PLMN-IdentityInfoList*, the *cellIdentity*, the *systemInformationAreaID*, if present, and the *valueTag*, if present, as indicated in the *si-SchedulingInfo* for the SIB. The UE may use a valid stored version of the SI except *MIB*, *SIB1*, *SIB6*, *SIB7* or *SIB8* e.g. after cell re-selection, upon return from out of coverage or after the reception of SI change indication.

NOTE: The storage and management of the stored SIBs in addition to the SIBs valid for the current serving cell is left to UE implementation.

The UE shall:

1> delete any stored version of a SIB after 3 hours from the moment it was successfully confirmed as valid;

1> for each stored version of a SIB:

2> if the *areaScope* is associated and its value for the stored version of the SIB is the same as the value received in the *si-SchedulingInfo* for that SIB from the serving cell:

3> if the first *PLMN-Identity* included in the *PLMN-IdentityInfoList*, the *systemInformationAreaID* and the *valueTag* that are included in the *si-SchedulingInfo* for the SIB received from the serving cell are identical to the *PLMN-Identity*, the *systemInformationAreaID* and the *valueTag* associated with the stored version of that SIB:

4> consider the stored SIB as valid for the cell;

Id. at 27.

38. By further way of example, each Accused Product comprises an indication of broadcast status for the SI message, the indication indicating broadcasting.

5.2.2.4.2 Actions upon reception of the *SIB1*

Upon receiving the *SIB1* the UE shall:

4> if the UE has not stored a valid version of a SIB, in accordance with sub-clause 5.2.2.2.1, of one or several required SIB(s), in accordance with sub-clause 5.2.2.1:

5> for the SI message(s) that, according to the *si-SchedulingInfo*, contain at least one required SIB and for which *si-BroadcastStatus* is set to broadcasting:

6> acquire the SI message(s) as defined in sub-clause 5.2.2.3.2;

Id. at 31-32.

– *SI-SchedulingInfo*

The IE *SI-SchedulingInfo* contains information needed for acquisition of SI messages.

***SI-SchedulingInfo* information element**

```
-- ASN1START
-- TAG-SI-SCHEDULINGINFO-START

SI-SchedulingInfo ::=               SEQUENCE {
    schedulingInfoList                  SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo,
    si-WindowLength                     ENUMERATED {s5, s10, s20, s40, s80, s160, s320, s640, s1280},
    si-RequestConfig                    SI-RequestConfig                                    OPTIONAL,  -- Cond MSG-1
    si-RequestConfigSUL                 SI-RequestConfig                                    OPTIONAL,  -- Cond SUL-MSG-1
    systemInformationAreaID             BIT STRING (SIZE (24))                              OPTIONAL,   -- Need R
    ...
}

SchedulingInfo ::=                  SEQUENCE {
    si-BroadcastStatus                  ENUMERATED {broadcasting, notBroadcasting},
    si-Periodicity                      ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},
    sib-MappingInfo                     SIB-Mapping


}

SIB-Mapping ::=                     SEQUENCE (SIZE (1..maxSIB)) OF SIB-TypeInfo

SIB-TypeInfo ::=                    SEQUENCE {
    type                                ENUMERATED {sibType2, sibType3, sibType4, sibType5, sibType6, sibType7, sibType8, sibType9,
                                                    spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1,... },
    valueTag                            INTEGER (0..31)                                     OPTIONAL, -- Cond SIB-TYPE
    areaScope                           ENUMERATED {true}                                   OPTIONAL -- Need S
}
```

Id. at 363-64.

39. By further way of example, each Accused Product comprises processor circuitry configured to cause the transmitting circuitry to broadcast the SI message.

5.2.2.4.2 Actions upon reception of the *SIB1*

Upon receiving the *SIB1* the UE shall:

4> if the UE has not stored a valid version of a SIB, in accordance with sub-clause 5.2.2.2.1, of one or several required SIB(s), in accordance with sub-clause 5.2.2.1:

5> for the SI message(s) that, according to the *si-SchedulingInfo*, contain at least one required SIB and for which *si-BroadcastStatus* is set to broadcasting:

6> acquire the SI message(s) as defined in sub-clause 5.2.2.3.2;

Id. at 31-32.

- SIBs other than *SIB1* are carried in *SystemInformation* (SI) messages, which are transmitted on the DL-SCH. Only SIBs having the same periodicity can be mapped to the same SI message. Each SI message is transmitted within periodically occurring time domain windows (referred to as SI-windows with same length for all SI messages). Each SI message is associated with an SI-window and the SI-windows of different SI messages do not overlap. That is, within one SI-window only the corresponding SI message is transmitted. An SI message may be transmitted a number of times within the SI-window. Any SIB except *SIB1* can be configured to be cell specific or area specific, using an indication in *SIB1*. The cell specific SIB is applicable only within a cell that provides the SIB while the area specific SIB is applicable within an area referred to as SI area, which consists of one or several cells and is identified by *systemInformationAreaID*;

Id. at 26.

40. By further way of example, in the Accused Products, the first type SIB is re-acquired by the user equipment upon the user equipment failing on the SI message acquisition process in at least one of the SI windows to receive the SI message.

5.2.2.2 SIB validity and need to (re)-acquire SIB

5.2.2.2.1 SIB validity

The UE shall apply the SI acquisition procedure as defined in clause 5.2.2.3 upon cell selection (e.g. upon power on), cell-reselection, return from out of coverage, after reconfiguration with sync completion, after entering the network from another RAT, upon receiving an indication that the system information has changed, upon receiving a PWS notification; and whenever the UE does not have a valid version of a stored SIB.

When the UE acquires a *MIB* or a *SIB1* or an SI message in a serving cell as described in clause 5.2.2.3, and if the UE stores the acquired SIB, then the UE shall store the associated *areaScope*, if present, the first *PLMN-Identity* in the *PLMN-IdentityInfoList*, the *cellIdentity*, the *systemInformationAreaID*, if present, and the *valueTag*, if present, as indicated in the *si-SchedulingInfo* for the SIB. The UE may use a valid stored version of the SI except *MIB*, *SIB1*, *SIB6*, *SIB7* or *SIB8* e.g. after cell re-selection, upon return from out of coverage or after the reception of SI change indication.

NOTE: The storage and management of the stored SIBs in addition to the SIBs valid for the current serving cell is left to UE implementation.

Id. at 27.

41. Verizon has indirectly infringed and continues to indirectly infringe one or more claims of the '557 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Verizon's partners, customers, clients, and end-users, in this District and elsewhere in the United States. For example, Verizon's partners, customers, clients, and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in

the ’557 Patent. Verizon induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to partners, customers, clients, and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation related to the Accused Products. Because of Verizon’s inducement, Verizon’s partners, customers, clients, and end-users use the Accused Products in a way Verizon intends and they directly infringe the ’557 Patent. Verizon performs these affirmative acts with knowledge of the ’557 Patent and with the intent, or willful blindness, that the induced acts directly infringe the ’557 Patent.

42. Verizon has indirectly infringed and continues to indirectly infringe one or more claims of the ’557 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as partners, customers, clients, and end-users, in this District and elsewhere in the United States. Verizon’s affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold, and offered for sale contribute to others’ use and manufacture of the Accused Products such that the ’557 Patent is directly infringed by others. The accused components within the Accused Products are material to the invention of the ’557 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Verizon to be especially made or adapted for use in the infringement of the ’557 Patent. Verizon performs these affirmative acts with knowledge of the ’557 Patent and with intent, or willful blindness, that they cause the direct infringement of the ’557 Patent.

43. AWT has suffered damages as a result of Defendants’ direct and indirect infringement of the ’557 Patent in an amount to be proved at trial.

COUNT III
(Infringement of the '764 Patent)

44. Paragraphs 1 through 19 are incorporated by reference as if fully set forth herein.

45. AWT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '764 Patent.

46. Defendants have and continue to directly infringe the '764 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '764 Patent. Such products include at least the Accused Products.

47. For example, Defendants have and continue to directly infringe at least claim 3 of the '764 Patent by making, using, offering to sell, selling, and/or importing into the United States products and services that operate with at least smart meters, industrial sensors, fleet management solutions, asset trackers, security cameras, and agricultural monitors that implement 3GPP standards (*e.g.*, 3GPP TS 36.331 V14.16.0, TS 36.213 V14.17.0 and TS 36.212 version 14.16.0), such as the Accused Products, which include a base station comprising: transmitting circuitry configured to transmit Single-Cell Multicast Control Channel (SC-MCCH) information; and generating circuitry configured to generate a second downlink control information (DCI) format indicating an SC-MCCH information change notification, wherein the transmitting circuitry is configured to transmit, in more than one second subframe, the second DCI format carried on a second narrowband physical downlink control channel (NPDCCH), the generating circuitry configured to generate a first DCI format indicating a resource for a transmission of another SC-MCCH information, the transmitting circuitry is configured to transmit, in more than one first subframe, the first DCI format carried on a first NPDDCH, a period of the more than one first

subframe is different from a period of the more than one second subframe, and the transmitting circuitry is configured to transmit the another SC-MCCH information with use of the resource indicated by the first DCI format and in accordance with the second DCI format.

48. For example, upon information and belief, the Accused Products include a base station compliant with the 3GPP TS 36.331 V14.16.0, TS 36.213 V14.17.0 and TS 36.212 version 14.16.0 standards.

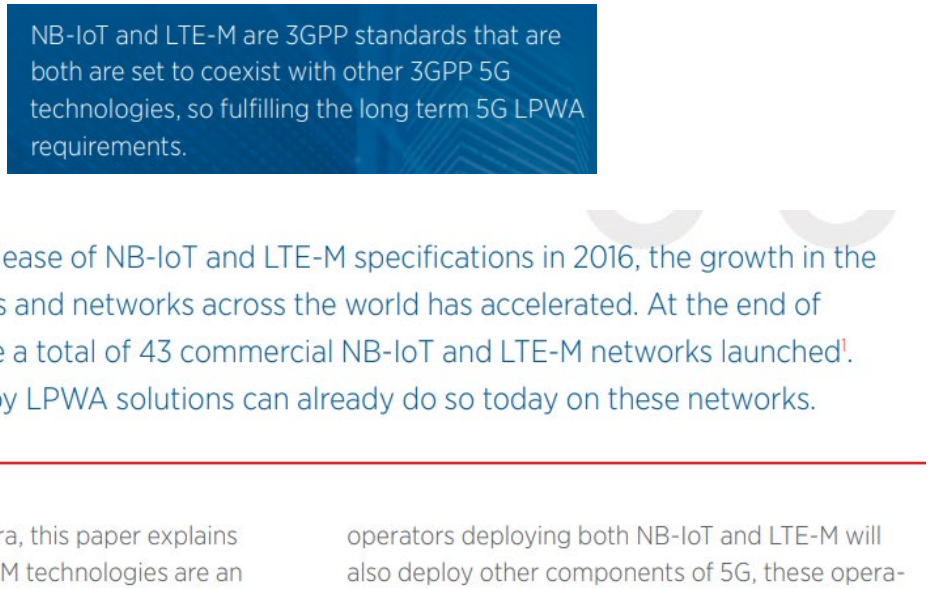


Exhibit 11, available at https://www.ericsson.com/4ac64d/assets/local/reports-papers/5g/doc/gsma-5g-mobile-iot.pdf, p. 2-3

A better network, built for the future of IoT

Whether your organizations have a few devices or thousands, efficiency has become a major concern. Enter Category M1 (Cat-M1) and Narrow Band (NB-IoT) technologies, specifically engineered for a variety of IoT solutions including low data throughput and high-energy efficiency -- in other words, exactly what IoT devices need.

Our 4G LTE network fully supports Cat-M1 and NB-IoT devices and include services specifically for IoT. LTE Cat-M1 and NB-IoT lowers the barrier of entry to the IoT world, providing a quick and easy way to develop, deploy and manage your machine-to-machine (M2M) solutions. When combined with our revolutionary network, these devices can be cost-effective, help support applications with low data needs and stay in the field much longer without needing to change batteries.

LTE Cat-M1 and NB-IoT also use networking protocols that help improve IoT coverage with better in-building and in-ground penetration. Our LTE technology also provides comprehensive security, with authentication, credentialing and encryption tools to keep your communications protected.

Get all the info you need to get up and running with 4G LTE for IoT >

Exhibit 12, available at https://www.verizon.com/business/products/internet-of-things/connected-assets/lte-category-m1-narrow-band-technologies/

There's a reason businesses of all sizes and in all industries are investing in Internet of Things (IoT) strategies: Turning the devices that power your business into connected IoT devices can help you work smarter and more efficiently. But IoT is not a one-size-fits-all solution, and in many cases how you connect can be just as important as what you connect. We understand that different IoT applications have different technology needs and different budgets, and we want to give you the options you need to find the best fit for you. Which is why we're introducing Verizon Narrowband IoT (NB-IoT).

Verizon NB-IoT provides a cost-effective option for IoT applications that depend on low-power wide area network (LPWAN) connectivity. As the latest addition to our line of LTE connectivity options, NB-IoT was designed to complement LTE-M (also known as CAT-M1), giving you the freedom to choose the level of connectivity that's best for your specific IoT application needs.

LTE-M and NB-IoT are both designed for LPWAN. While LTE-M is designed to support the higher bandwidth of LPWAN technology and is ideal for fixed and mobile applications, Verizon NB-IoT is designed specifically to suit the needs of stationary IoT applications that demand only small transmissions of data, thereby connecting to the network less often. By reducing the frequency and size of connections, Verizon NB-IoT offers dramatically improved power optimization. This extended battery life—which can last more than 10 years in some cases—makes it an ideal option for IoT applications in hard-to-connect places that require regular but less frequent monitoring.

Like LTE-M, Verizon NB-IoT is an additional—and complementary—LPWAN connectivity option, so you can make the choice that's best for your IoT application.

Do IoT your way.

There is no wrong way to design your IoT strategy, but Verizon NB-IoT gives you options to make the right choices. Verizon NB-IoT is a comprehensive solution that includes:

Modules

To help you develop the right NB-IoT devices for your IoT applications, we have teamed up with a number of trusted partners to provide you with a rich ecosystem of certified modules. We also offer free self-certification for NB-IoT devices, design consultations and power-saving features to help you build your IoT devices cost-effectively.

Connectivity

Verizon NB-IoT network service is a cellular connectivity offering that provides data and SMS services, ubiquitous extended long-range coverage, and improved indoor and underground coverage. All on a reliable, scalable and secure LTE network.

Exhibit 13, available at https://opendevelopment.verizonwireless.com/news/article/Verizon_Narrowband_Internet_of_Things

49. By way of example, each Accused Product comprises a base station with transmitting circuitry configured to transmit Single-Cell Multicast Control Channel (SC-MCCH) information.

5.8a.1.2 SC-MCCH scheduling

The SC-MCCH information (i.e. information transmitted in messages sent over SC-MCCH) is transmitted periodically, using a configurable repetition period. SC-MCCH transmissions (and the associated radio resources and MCS) are indicated on PDCCH.

5.8a.1.3 SC-MCCH information validity and notification of changes

Change of SC-MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same SC-MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period). The modification period boundaries are defined by SFN values for which SFN mod m= 0, where m is the number of radio frames comprising the modification period. The modification period is configured by means of *SystemInformationBlockType20* (*SystemInformationBlockType20-NB* in NB-IoT). If H-SFN is provided in *SystemInformationBlockType1-BR*, modification period boundaries for BL UEs or UEs in CE are defined by SFN values for which (H-SFN * 1024 + SFN) mod m=0. The modification period boundaries for NB-IoT UEs are defined by SFN values for which (H-SFN * 1024 + SFN) mod m=0.

When the network changes (some of) the SC-MCCH information, it notifies the UEs, other than BL UEs, UEs in CE or NB-IoT UEs, about the change in the first subframe which can be used for SC-MCCH transmission in a repetition period. LSB bit in 8-bit bitmap when set to '1' indicates the change in SC-MCCH. Upon receiving a change notification, a UE interested to receive MBMS services transmitted using SC-PTM acquires the new SC-MCCH information starting from the same subframe. The UE applies the previously acquired SC-MCCH information until the UE acquires the new SC-MCCH information.

When the network changes (some of) the SC-MCCH information for start of new MBMS service(s) transmitted using SC-PTM, it notifies BL UEs, UEs in CE or NB-IoT UEs about the change in every PDCCH which schedules the first SC-MCCH in a repetition period in the current modification period. The notification is transmitted with 1 bit. The bit, when set to '1', indicates the start of new MBMS service(s), see TS 36.212 [22, 5.3.3.1.14 & 6.4.3.3]. Upon receiving a change notification, a BL UE, UE in CE or NB-IoT UE interested to receive MBMS services transmitted using SC-PTM acquires the new SC-MCCH information scheduled by the PDCCH. The BL UE, UE in CE or NB-IoT UE applies the previously acquired SC-MCCH information until the BL UE, UE in CE or NB-IoT UE acquires the new SC-MCCH information.

Exhibit 16 ("3GPP TS 36.331 version 14.16.0 Release 14"), at 209-210, available at https://www.etsi.org/deliver/etsi_ts/136300_136399/136331/14.16.00_60/ts_136331v141600p.pdf

50. By further way of example, each Accused Product comprises generating circuitry configured to generate a second downlink control information (DCI) format indicating an SC-MCCH information change notification.

6.4.3.2 DCI Format N1

DCI format N1 is used for the scheduling of one NPDSCH codeword in one cell, random access procedure initiated by a NPDCCH order, and notifying SC-MCCH change. The DCI corresponding to a NPDCCH order is carried by NPDCCH.

The following information is transmitted by means of the DCI format N1:

- If the format N1 CRC is scrambled by C-RNTI or RA-RNTI:
  - Flag for format N0/format N1 differentiation – 1 bit, where value 0 indicates format N0 and value 1 indicates format N1
  - NPDCCH order indicator – 1 bit
- Else if the format N1 CRC is scrambled by a G-RNTI:
  - Information for SC-MCCH change notification – 2 bits as defined in clause 5.8a of [6]

Exhibit 17 ("3GPP TS 36.212 version 14.16.0 Release 14"), at 199, available at https://www.etsi.org/deliver/etsi_ts/136200_136299/136212/14.16.00_60/ts_136212v141600p.pdf

51. By further way of example, each Accused Product comprises transmitting circuitry configured to transmit, in more than one second subframe, the second DCI format carried on a second narrowband physical downlink control channel (NPDCCH).

16.4.1 UE procedure for receiving the narrowband physical downlink shared channel

A UE shall upon detection on a given serving cell of a NPDCCH with DCI format N1, N2 ending in subframe n intended for the UE, decode, starting in $n+5$ DL subframe, the corresponding NPDSCH transmission in N consecutive NB-IoT DL subframe(s) n_i with $i = 0, 1, \ldots, N-1$ according to the NPDCCH information, where

- subframe n is the last subframe in which the NPDCCH is transmitted and is determined from the starting subframe of NPDCCH transmission and the DCI subframe repetition number field in the corresponding DCI;
- subframe(s) n_i with $i=0,1,\ldots,N-1$ are N consecutive NB-IoT DL subframe(s) excluding subframes used for SI messages where, $n_0<n_1<\ldots,n_{N-1}$,,
- $N=N_{Rep}N_{SF}$, where the value of N_{Rep} is determined by the repetition number field in the corresponding DCI (see Subclause 16.4.1.3), and the value of N_{SF} is determined by the resource assignment field in the corresponding DCI (see Subclause 16.4.1.3), and
- k_0 is the number of NB-IoT DL subframe(s) starting in DL subframe $n+5$ until DL subframe n_0, where k_0 is determined by the scheduling delay field (I_{Delay}) for DCI format N1, and $k_0 = 0$ for DCI format N2. For DCI CRC scrambled by G-RNTI, k_0 is determined by the scheduling delay field (I_{Delay}) according to Table 16.4.1-1a, otherwise k_0 is determined by the scheduling delay field (I_{Delay}) according to Table 16.4.1-1. The value of R_{max} is according to Subclause 16.6 for the corresponding DCI format N1.

Exhibit 18 ("3GPP TS 36.213 version 14.17.0 Release 14"), at 441, available at https://www.etsi.org/deliver/etsi_ts/136200_136299/136213/14.17.00_60/ts_136213v141700p.pdf

52. By further way of example, each Accused Product comprises generating circuitry configured to generate a first DCI format indicating a resource for a transmission of another SC-MCCH information.

6.4.3.3 DCI Format N2

DCI format N2 is used for paging, direct indication, scheduling of one NPDSCH codeword carrying SC-MCCH in one cell, and notifying SC-MCCH change.

The following information is transmitted by means of the DCI format N2:

Exhibit 17, at 199.

5.8a.1.2 SC-MCCH scheduling

The SC-MCCH information (i.e. information transmitted in messages sent over SC-MCCH) is transmitted periodically, using a configurable repetition period. SC-MCCH transmissions (and the associated radio resources and MCS) are indicated on PDCCH.

5.8a.1.3 SC-MCCH information validity and notification of changes

Change of SC-MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same SC-MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period). The modification period boundaries are defined by SFN values for which SFN mod m= 0, where m is the number of radio frames comprising the modification period. The modification period is configured by means of *SystemInformationBlockType20* (*SystemInformationBlockType20-NB* in NB-IoT). If H-SFN is provided in *SystemInformationBlockType1-BR*, modification period boundaries for BL UEs or UEs in CE are defined by SFN values for which (H-SFN * 1024 + SFN) mod m=0. The modification period boundaries for NB-IoT UEs are defined by SFN values for which (H-SFN * 1024 + SFN) mod m=0.

When the network changes (some of) the SC-MCCH information, it notifies the UEs, other than BL UEs, UEs in CE or NB-IoT UEs, about the change in the first subframe which can be used for SC-MCCH transmission in a repetition period. LSB bit in 8-bit bitmap when set to '1' indicates the change in SC-MCCH. Upon receiving a change notification, a UE interested to receive MBMS services transmitted using SC-PTM acquires the new SC-MCCH information starting from the same subframe. The UE applies the previously acquired SC-MCCH information until the UE acquires the new SC-MCCH information.

When the network changes (some of) the SC-MCCH information for start of new MBMS service(s) transmitted using SC-PTM, it notifies BL UEs, UEs in CE or NB-IoT UEs about the change in every PDCCH which schedules the first SC-MCCH in a repetition period in the current modification period. The notification is transmitted with 1 bit. The bit, when set to '1', indicates the start of new MBMS service(s), see TS 36.212 [22, 5.3.3.1.14 & 6.4.3.3]. Upon receiving a change notification, a BL UE, UE in CE or NB-IoT UE interested to receive MBMS services transmitted using SC-PTM acquires the new SC-MCCH information scheduled by the PDCCH. The BL UE, UE in CE or NB-IoT UE applies the previously acquired SC-MCCH information until the BL UE, UE in CE or NB-IoT UE acquires the new SC-MCCH information.

Exhibit 16, at 209.

53. By further way of example, each Accused Product comprises transmitting circuitry configured to transmit, in more than one first subframe, the first DCI format carried on a first NPDDCH.

16.4.1 UE procedure for receiving the narrowband physical downlink shared channel

A UE shall upon detection on a given serving cell of a NPDCCH with DCI format N1, N2 ending in subframe n intended for the UE, decode, starting in $n+5$ DL subframe, the corresponding NPDSCH transmission in N consecutive NB-IoT DL subframe(s) n_i with $i = 0, 1, \ldots, N-1$ according to the NPDCCH information, where

- subframe n is the last subframe in which the NPDCCH is transmitted and is determined from the starting subframe of NPDCCH transmission and the DCI subframe repetition number field in the corresponding DCI;
- subframe(s) n_i with $i=0,1,\ldots,N-1$ are N consecutive NB-IoT DL subframe(s) excluding subframes used for SI messages where, $n_0<n_1<\ldots,n_{N-1}$,,
- $N=N_{Rep}N_{SF}$, where the value of N_{Rep} is determined by the repetition number field in the corresponding DCI (see Subclause 16.4.1.3), and the value of N_{SF} is determined by the resource assignment field in the corresponding DCI (see Subclause 16.4.1.3), and
- k_0 is the number of NB-IoT DL subframe(s) starting in DL subframe $n+5$ until DL subframe n_0, where k_0 is determined by the scheduling delay field (I_{Delay}) for DCI format N1, and $k_0 = 0$ for DCI format N2. For DCI CRC scrambled by G-RNTI, k_0 is determined by the scheduling delay field (I_{Delay}) according to Table 16.4.1-1a, otherwise k_0 is determined by the scheduling delay field (I_{Delay}) according to Table 16.4.1-1. The value of R_{max} is according to Subclause 16.6 for the corresponding DCI format N1.

Exhibit 18, at 441.

54. By further way of example, in the Accused Products, a period of the more than one first subframe is different from a period of the more than one second subframe.

5.8a.1.3 SC-MCCH information validity and notification of changes

When the network changes SC-MTCH specific information e.g. start of new MBMS service(s) transmitted using SC-PTM or change of ongoing MBMS service(s) transmitted using SC-PTM, it notifies the BL UEs, UEs in CE or NB-IoT UEs in the PDCCH which schedules the SC-MTCH in the current modification period. The notification is transmitted with a 2 bit bitmap. The LSB in the 2-bit bitmap, when set to '1', indicates the change of the on-going MBMS service and the MSB in the 2-bit bitmap, when set to '1', indicates the start of new MBMS service(s), see TS 36.212 [22, 5.3.3.1.12 & 5.3.3.1.13 & 6.4.3.2]. In the case the network changes an on-going SC-MTCH transmission in the next modification period, it notifies the BL UEs, UEs in CE or NB-IoT UEs in the PDCCH which schedules this SC-MTCH in the current modification period. In the case the network starts new MBMS service(s) transmitted using SC-PTM, the network notifies the UEs which have on-going SC-MTCH in the PDCCH scheduling each of the SC-MTCH. Upon receiving such notification, a BL UE, UE in CE or NB-IoT UE acquires the new SC-MCCH information at the start of the next modification period. The BL UE, UE in CE or NB-IoT UE applies the previously acquired SC-MCCH information until the BL UE, UE in CE or NB-IoT UE acquires the new SC-MCCH information.

Exhibit 16, at 209-210.

5.8.1.3 MCCH information validity and notification of changes

Change of MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period). The modification period boundaries are defined by SFN values for which SFN mod m= 0, where m is the number of radio frames comprising the modification period. The modification period is configured by means of *SystemInformationBlockType13*.

When the network changes (some of) the MCCH information, it notifies the UEs about the change during a first modification period. In the next modification period, the network transmits the updated MCCH information. These general principles are illustrated in figure 5.8.1.3-1, in which different colours indicate different MCCH information. Upon receiving a change notification, a UE interested to receive MBMS services acquires the new MCCH information immediately from the start of the next modification period. The UE applies the previously acquired MCCH information until the UE acquires the new MCCH information.

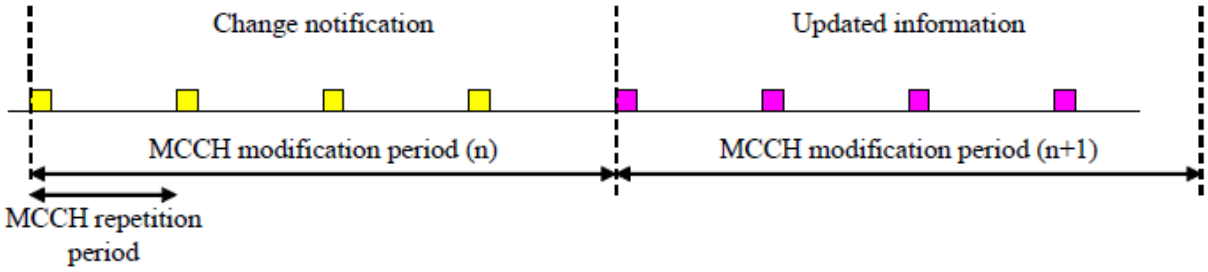


Figure 5.8.1.3-1: Change of MCCH Information

Id. at 202-203.

55. By further way of example, each Accused Product comprises transmitting circuitry configured to transmit the another SC-MCCH information with use of the resource indicated by the first DCI format and in accordance with the second DCI format.

6.4.3.3 DCI Format N2

DCI format N2 is used for paging, direct indication, scheduling of one NPDSCH codeword carrying SC-MCCH in one cell, and notifying SC-MCCH change.

The following information is transmitted by means of the DCI format N2:

- If the format N2 CRC is scrambled by P-RNTI:
  - Flag for paging/direct indication differentiation – 1 bit, with value 0 for direct indication and value 1 for paging
- Else if the format N2 CRC is scrambled by a SC-RNTI:
  - Information for SC-MCCH change notification – 1 bit as defined in clause 5.8a of [6]
- If the format N2 CRC is scrambled by P-RNTI and Flag=0:
  - Direct Indication information – 8 bits provide direct indication of system information update and other fields, as defined in [6]
  - Reserved information bits are added until the size is equal to that of format N2 with Flag=1
- If the format N2 CRC is scrambled by P-RNTI and Flag=1, or if the format N2 CRC is scrambled by SC-RNTI:
  - Resource assignment – 3 bits as defined in clause 16.4.1.3 of [3]
  - Modulation and coding scheme – 4 bits as defined in clause 16.4.1.5 of [3]
  - Repetition number – 4 bits as defined in clause 16.4.1.3 of [3]
  - DCI subframe repetition number – 3 bits as defined in clause 16.6 of [3]

Exhibit 17, at 199-200.

6.4.3.2 DCI Format N1

DCI format N1 is used for the scheduling of one NPDSCH codeword in one cell, random access procedure initiated by a NPDCCH order, and notifying SC-MCCH change. The DCI corresponding to a NPDCCH order is carried by NPDCCH.

The following information is transmitted by means of the DCI format N1:

- If the format N1 CRC is scrambled by C-RNTI or RA-RNTI:
  - Flag for format N0/format N1 differentiation – 1 bit, where value 0 indicates format N0 and value 1 indicates format N1
  - NPDCCH order indicator – 1 bit
- Else if the format N1 CRC is scrambled by a G-RNTI:
  - Information for SC-MCCH change notification – 2 bits as defined in clause 5.8a of [6]

Id., at 199.

56. Verizon has indirectly infringed and continues to indirectly infringe one or more claims of the '764 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Verizon's partners, customers, clients, and end-users, in this District and elsewhere in the United States. For example, Verizon's partners, customers, clients, and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '764 Patent. Verizon induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to partners, customers, clients, and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation related to the Accused Products. Because of Verizon's inducement, Verizon's partners, customers, clients, and end-users use the Accused Products in a way Verizon intends and they directly infringe the '764 Patent. Verizon performs these affirmative acts with knowledge of the '764 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '764 Patent.

57. Verizon has indirectly infringed and continues to indirectly infringe one or more claims of the '764 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as partners, customers, clients, and end-users, in this District and elsewhere in the United States. Verizon's affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold, and offered for sale contribute to others' use and manufacture of the Accused Products such that the '764 Patent is directly infringed by others. The accused components within the Accused Products are material to the invention of the '764 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are

known by Verizon to be especially made or adapted for use in the infringement of the '764 Patent. Verizon performs these affirmative acts with knowledge of the '764 Patent and with intent, or willful blindness, that they cause the direct infringement of the '764 Patent.

58. AWT has suffered damages as a result of Defendants' direct and indirect infringement of the '764 Patent in an amount to be proved at trial.

COUNT IV
(Infringement of the '566 Patent)

59. Paragraphs 1 through 19 are incorporated by reference as if fully set forth herein.

60. AWT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '566 Patent.

61. Defendants have and continue to directly infringe the '566 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling, and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '566 Patent. Such products include at least the Accused Products.

62. For example, Defendants have and continue to directly infringe at least claim 8 of the '566 Patent by making, using, offering to sell, selling, and/or importing into the United States products and services that operate with at least phones, tablets, and hotspot devices that implement 3GPP standards (e.g., 3GPP TS 38.213 V15.14.0 and TS 38.331 V15.13.0), such as the Accused Products, which include a base station (gNB) comprising: a processor; and memory in electronic communication with the processor, wherein instructions stored in the memory are executable to: transmit, to a user equipment (UE), a signaling, an uplink control channel (PUCCH) spans over multiple slots being determined based on the signaling; and receive uplink control information (UCI) with the frequency hopping for the configured multiple slots PUCCH, wherein the number

of symbols of the PUCCH is the same in each slot of the multiple slots, and the location of the symbols for the PUCCH is the same in the each slot of the multiple slots.

63. For example, upon information and belief, each Accused Product comprises a base station (gNB) comprising a processor and memory in electronic communication with the processor, which is compliant with the 3GPP TS 38.213 V15.14.0 and 3GPP TS 38.331 V15.13.0 standards.

> Verizon
> "Verizon is delighted that the 3GPP is moving quickly to release a global standard for mobile 5G," said Ed Chan, Chief Technology Architect and Network Planning."With this important 3GPP milestone, Verizon is once again well positioned to deliver next-generation technology to customers just as we did with 4G LTE."

Exhibit 13, available at https://www.3gpp.org/news-events/3gpp-news/industry-pr-5g

64. By way of example, each Accused Product transmits, to a user equipment (UE), a signaling, an uplink control channel (PUCCH) spans over multiple slots being determined based on the signaling.

9.2.6 PUCCH repetition procedure

For PUCCH formats 1, 3, or 4, a UE can be configured a number of slots, N_{PUCCH}^{repeat}, for repetitions of a PUCCH transmission by respective *nrofSlots*.

For $N_{PUCCH}^{repeat} > 1$,

- the UE repeats the PUCCH transmission with the UCI over N_{PUCCH}^{repeat} slots
- a PUCCH transmission in each of the N_{PUCCH}^{repeat} slots has a same number of consecutive symbols, as provided by *nrofSymbols* in *PUCCH-format1*, *nrofSymbols* in *PUCCH-format3*, or *nrofSymbols* in *PUCCH-format4*
- a PUCCH transmission in each of the N_{PUCCH}^{repeat} slots has a same first symbol, as provided by *startingSymbolIndex* in *PUCCH-format1*, *startingSymbolIndex* in *PUCCH-format3*, or *startingSymbolIndex* in *PUCCH-format4*
- the UE is configured by *interslotFrequencyHopping* whether or not to perform frequency hopping for PUCCH transmissions in different slots
  - if the UE is configured to perform frequency hopping for PUCCH transmissions across different slots
    - the UE performs frequency hopping per slot
    - the UE transmits the PUCCH starting from a first PRB, provided by *startingPRB*, in slots with even number and starting from the second PRB, provided by *secondHopPRB*, in slots with odd number. The slot indicated to the UE for the first PUCCH transmission has number 0 and each subsequent slot until the UE transmits the PUCCH in N_{PUCCH}^{repeat} slots is counted regardless of whether or not the UE transmits the PUCCH in the slot
    - the UE does not expect to be configured to perform frequency hopping for a PUCCH transmission within a slot
  - If the UE is not configured to perform frequency hopping for PUCCH transmissions across different slots and if the UE is configured to perform frequency hopping for PUCCH transmissions within a slot, the frequency hopping pattern between the first PRB and the second PRB is same within each slot

Exhibit 14, at 69.

```
PUCCH-FormatConfig ::=              SEQUENCE {
    interslotFrequencyHopping           ENUMERATED {enabled}                    OPTIONAL,  -- Need R
    additionalDMRS                      ENUMERATED {true}                       OPTIONAL,  -- Need R
    maxCodeRate                         PUCCH-MaxCodeRate                       OPTIONAL,  -- Need R
    nrofSlots                           ENUMERATED {n2,n4,n8}                   OPTIONAL,  -- Need S
    pi2BPSK                             ENUMERATED {enabled}                    OPTIONAL,  -- Need R
    simultaneousHARQ-ACK-CSI            ENUMERATED {true}                       OPTIONAL   -- Need R
}
```

Exhibit 15, at 298.

65. By further way of example, each Accused Product receives uplink control information (UCI) with the frequency hopping for the configured multiple slots PUCCH.

9.2.6 PUCCH repetition procedure

For PUCCH formats 1, 3, or 4, a UE can be configured a number of slots, N_{PUCCH}^{repeat}, for repetitions of a PUCCH transmission by respective *nrofSlots*.

For $N_{PUCCH}^{repeat} > 1$,

- the UE repeats the PUCCH transmission with the UCI over N_{PUCCH}^{repeat} slots
- a PUCCH transmission in each of the N_{PUCCH}^{repeat} slots has a same number of consecutive symbols, as provided by *nrofSymbols* in *PUCCH-format1*, *nrofSymbols* in *PUCCH-format3*, or *nrofSymbols* in *PUCCH-format4*
- a PUCCH transmission in each of the N_{PUCCH}^{repeat} slots has a same first symbol, as provided by *startingSymbolIndex* in *PUCCH-format1*, *startingSymbolIndex* in *PUCCH-format3*, or *startingSymbolIndex* in *PUCCH-format4*
- the UE is configured by *interslotFrequencyHopping* whether or not to perform frequency hopping for PUCCH transmissions in different slots
  - if the UE is configured to perform frequency hopping for PUCCH transmissions across different slots
    - the UE performs frequency hopping per slot
    - the UE transmits the PUCCH starting from a first PRB, provided by *startingPRB*, in slots with even number and starting from the second PRB, provided by *secondHopPRB*, in slots with odd number. The slot indicated to the UE for the first PUCCH transmission has number 0 and each subsequent slot until the UE transmits the PUCCH in N_{PUCCH}^{repeat} slots is counted regardless of whether or not the UE transmits the PUCCH in the slot
    - the UE does not expect to be configured to perform frequency hopping for a PUCCH transmission within a slot
  - If the UE is not configured to perform frequency hopping for PUCCH transmissions across different slots and if the UE is configured to perform frequency hopping for PUCCH transmissions within a slot, the frequency hopping pattern between the first PRB and the second PRB is same within each slot

Exhibit 14, at 69.

66. By further way of example, in the Accused Products, the number of symbols of the PUCCH is the same in each slot of the multiple slots and the location of the symbols for the PUCCH is the same in the each slot of the multiple slots.

9.2.6 PUCCH repetition procedure

For PUCCH formats 1, 3, or 4, a UE can be configured a number of slots, N_{PUCCH}^{repeat}, for repetitions of a PUCCH transmission by respective *nrofSlots*.

For $N_{PUCCH}^{repeat} > 1$,

- the UE repeats the PUCCH transmission with the UCI over N_{PUCCH}^{repeat} slots
- a PUCCH transmission in each of the N_{PUCCH}^{repeat} slots has a same number of consecutive symbols, as provided by *nrofSymbols* in *PUCCH-format1*, *nrofSymbols* in *PUCCH-format3*, or *nrofSymbols* in *PUCCH-format4*
- a PUCCH transmission in each of the N_{PUCCH}^{repeat} slots has a same first symbol, as provided by *startingSymbolIndex* in *PUCCH-format1*, *startingSymbolIndex* in *PUCCH-format3*, or *startingSymbolIndex* in *PUCCH-format4*
- the UE is configured by *interslotFrequencyHopping* whether or not to perform frequency hopping for PUCCH transmissions in different slots
  - if the UE is configured to perform frequency hopping for PUCCH transmissions across different slots
    - the UE performs frequency hopping per slot
    - the UE transmits the PUCCH starting from a first PRB, provided by *startingPRB*, in slots with even number and starting from the second PRB, provided by *secondHopPRB*, in slots with odd number. The slot indicated to the UE for the first PUCCH transmission has number 0 and each subsequent slot until the UE transmits the PUCCH in N_{PUCCH}^{repeat} slots is counted regardless of whether or not the UE transmits the PUCCH in the slot
    - the UE does not expect to be configured to perform frequency hopping for a PUCCH transmission within a slot
  - If the UE is not configured to perform frequency hopping for PUCCH transmissions across different slots and if the UE is configured to perform frequency hopping for PUCCH transmissions within a slot, the frequency hopping pattern between the first PRB and the second PRB is same within each slot

Exhibit 14, at 69.

67. Verizon has indirectly infringed and continues to indirectly infringe one or more claims of the '566 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Verizon's partners, customers, clients, and end-users, in this District and elsewhere in the United States. For example, Verizon's partners, customers, clients, and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '566 Patent. Verizon induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to partners, customers, clients, and

end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation related to the Accused Products. Because of Verizon's inducement, Verizon's partners, customers, clients, and end-users use the Accused Products in a way Verizon intends and they directly infringe the '566 Patent. Verizon performs these affirmative acts with knowledge of the '566 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '566 Patent.

68. Verizon has indirectly infringed and continues to indirectly infringe one or more claims of the '566 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as partners, customers, clients, and end-users, in this District and elsewhere in the United States. Verizon's affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold, and offered for sale contribute to others' use and manufacture of the Accused Products such that the '566 Patent is directly infringed by others. The accused components within the Accused Products are material to the invention of the '566 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Verizon to be especially made or adapted for use in the infringement of the '566 Patent. Verizon performs these affirmative acts with knowledge of the '566 Patent and with intent, or willful blindness, that they cause the direct infringement of the '566 Patent.

69. AWT has suffered damages as a result of Defendants' direct and indirect infringement of the '566 Patent in an amount to be proved at trial.

DEMAND FOR JURY TRIAL

Plaintiff hereby demands a jury for all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, AWT prays for relief against Defendants as follows:

a. Entry of judgment declaring that Defendants have directly and/or indirectly infringed one or more claims of each of the Patents-in-Suit;

b. An order awarding damages sufficient to compensate AWT for Defendants' infringement of the Patents-in-Suit, but in no event less than a reasonable royalty, together with interest and costs;

c. Entry of judgment declaring that this case is exceptional and awarding AWT its costs and reasonable attorney fees under 35 U.S.C. § 285; and

d. Such other and further relief as the Court deems just and proper.

Dated: December 20, 2023

Respectfully submitted,

/s/ *Alfred R. Fabricant*

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